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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,006	07/10/2003	Yonglin Huang	15436.251.1.1	3071

7590 03/02/2005

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EXAMINER	
KALIVODA, CHRISTOPHER M	
ART UNIT	PAPER NUMBER
2883	

DATE MAILED: 03/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/617,006	HUANG ET AL.	
	Examiner	Art Unit	
	Christopher M. Kalivoda	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 19-30* is/are rejected.

7)☒ Claim(s) *11,16-18,20,23 and 31-33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/4/03 & 4/13/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance. Please see paragraph 006, line 1 of specification.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The disclosure is objected to because of the following informalities: In paragraph 34, line 4, ref sign 2 should be 2A. In paragraph 32, line 2, the word "is" should be "in". In paragraph 42, line 2, the words "from the" or "through the" should be deleted. IN paragraph 44, line 1, the word photodiode is missing the first letter "p".
Appropriate correction is required.

Claim Objections

Claims 11, 20 and 23 are objected to because of the following informalities:

In claim 11, in line 4, the word "faraday" should be "Faraday".

In claim 20, line 1, the word "constructing" should be "attaching" to be consistent with claim 19, line 6.

In claim 23, line 1, there is a missing word such as "coupling" after the word "comprising". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "the output connector" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "the electronic signals" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7-9, 19, 21, 22, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al., U.S. Patent 6,597,479.

Regarding independent claims 1 and 19 as claimed, Chu et al. teach a transceiver module/method of making a transceiver (Fig 8 ref sign 560) for both transmitting and receiving optical data over a single fiber optic cable in a fiber optic network (col 6, lines 18-22 and Fig 8, ref sign 202A) comprising a substrate, an active component part comprising a laser diode (col 6, lines 45-48 and Fig 8, ref sign 10) and a photodiode (col 6, lines 33-36 and Fig 8, ref sign 830) and a circulator (col 6, lines 22-25 and Fig 8, ref sign 820) disposed on the substrate an optically coupled to the active component part, the circulator having a first port optically coupled to the laser diode (Fig 8, path between ref sign 820 and 810 enters port 1 since this can be a circulator as described above) wherein optical data at the first input port is output at a second port (Fig 8, path between 820 and 202 enters port 2 since this can be a circulator as described above), the second port for transmitting and receiving optical data from the fiber optic network (col 6, lines 18-22 and Fig 8, ref sign 202A and please note double arrow signaling bidirectional capability) where the optical data at the second port is output to a third port (Fig 8, path between 820 and 830 enters port 3 since this can be a circulator as described above) that is optically connected to a photodiode (Fig 8, ref sign 830 as described above).

While the reference does not specifically state the diodes and circulator in on a "substrate", clearly, they are mounted in order to keep the components in place.

Regarding claims 2-4, 24 and 25, Chu et al. teach the limitation of claims 1 and 19 as described above. The reference clearly shows discrete laser diode (Fig 8, ref sign 810) and a discrete photodiode (Fig 8, ref sign 830).

However, the reference is silent with respect to the active part being formed monolithically or having a discrete laser and photodiodes "bonded" with epoxy to the substrate.

It would have been an obvious matter of design choice to form the active part monolithically or bond the laser diode and photodiode to the substrate using an epoxy since applicant has not disclosed that forming the active part monolithically or bonding the laser diode and photodiode to the substrate using an epoxy solves any stated problem or is for any particular purpose and it appears that the invention would equally perform well with both types of active components. Such a design choice would obviously ease manufacturing.

Regarding claims 5, 21 and 22, Chu et al. teaches the limitations of claims 4 and 19 as described above. In addition, the second port is coupled to the photodiode through a fiber optic pigtail (Fig 8, double lined arrow pointing from 820 to 830). Since the double line arrow (202A) is an optical fiber as described above, Examiner is interpreting all double lined arrows as fiber and single line arrows as electrical lines.

However, the reference is silent with respect to the active part coupled to the circulator port through free space.

It would have been an obvious matter of design choice to couple the active part to the circulator through free space since applicant has not disclosed that coupling the active part to the circulator through free space solves any stated problem or is for any particular purpose and it appears that the invention would equally perform well without coupling the active part to the circulator through free space. Such a design choice would obviously reduce the number of components, complexity and cost since fewer components would be required.

Regarding claim 7, the second port is optically coupled to an output connector (col 4, lines 48-53 shows 563 as a connector and Fig 8, ref sign 563).

Regarding claim 8, the output connector can be at least one of small form factor, small form factor pluggable or GBIC (abstract, lines 1-4) since it is used in a fiber optic network.

Regarding claim 9, there is an electronic interface coupled to the laser diode and photodiode comprising circuitry for converting electronic data signals into a driving signal for driving the laser diode (col 6, lines 13-18) and for converting signals from the photodiode to electronic data signals (col 6, lines 33-36).

Claims 6, 11-15, 20, 23 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al., U.S. Patent 6,597,479 in view of Kokkelink et al., U.S. Patent 6,229,661.

Regarding claim 6 and 23, Chu et al. teach the limitations of claim 1 and claim 19 as described above.

In addition, the active part is coupled to the circulator through at least one fiber optic pigtail (Fig 8, double lined arrow pointing from 820 to 810). Since the double line arrow (202A) is an optical fiber as described above, Examiner is interpreting all double lined arrows as fiber and single line arrows as electrical lines.

However, the reference is silent with respect to the laser diode being coupled to the circulator through a polarization maintaining fiber.

Kokkelink et al. describes a polarization maintaining optical circulator (col 2, line 47-48) in which polarization maintaining fibers are used at the ports (Fig 3a, ref sign 1).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chu et al. to specifically include the laser diode being coupled to the circulator through a polarization maintaining fiber for the purpose of assuring maximum performance by eliminating power coupling from one polarization state to another and thus power coupling between ports (col 4, lines 20-23).

Regarding claims 11, 15 and 20, Chu et al. teach the limitations of claims 1 and 19 as described above.

However, the reference is silent with respect to the circulator including a core comprising a first wedge, a Faraday rotator coupled to the first wedge, a second wedge coupled to the Faraday rotator wherein the first wedge, second wedge and Faraday rotator are arranged such that the core is optically non-reciprocal in transmit and receive directions. It is also silent with another embodiment wherein the first and second wedges are thin film cubes.

Kokkelink et al. describes a polarization maintaining optical circulator (col 2, line 47-48) including a core comprising a first wedge (Fig 1a, ref sign 12), a Faraday rotator coupled to the first wedge (Fig 1a, ref sign 10), a second wedge coupled to the Faraday rotator (Fig 1a, ref sign 14) wherein the first wedge, second wedge and Faraday rotator are arranged such that the core is optically non-reciprocal in transmit and receive directions (col 2, line 49-56). In addition, Kokkelink et al. describes a polarization maintaining optical circulator in which cubes are used (Fig 3a, ref sign 40).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chu et al. to include the optical circulator/core of Kokkelink et al. and include a first wedge (Fig 1a, ref sign 12), a Faraday rotator coupled to the first wedge (Fig 1a, ref sign 10), a second wedge coupled to the Faraday rotator (Fig 1a, ref sign 14) wherein the first wedge, second wedge and Faraday rotator are arranged such that the core is optically non-reciprocal in transmit and receive directions (col 2, line 49-56) or have the first and second wedges as thin film cubes for the purpose of maintaining polarization (col 1, line 12-16).

Regarding claims 12-14, Chu et al. teach the limitations of claim 11 as described above.

However, the reference is silent with respect to the Faraday rotator comprising a latching material, non-latching material or the first and second wedges being one or more of Wollaston, Rochon, Glan-Thomson and Glan-Taylor prisms.

It would have been an obvious matter of design choice to select materials wherein the Faraday rotator comprises a latching or non-latching material or to use one or more of Wollaston, Rochon, Glan-Thomson and Glan-Taylor prisms since Applicant has not stated that selecting a latching material, a non-latching material or using first and second wedges that are one or more of Wollaston, Rochon, Glan-Thomson and Glan-Taylor prisms solves any stated problem (but only references benefits of latching/non-latching) or is for any particular purpose and it appears that the invention would perform equally well with or without a Faraday rotator comprising a latching material or using Wollaston, Rochon, Glan-Thomson and Glan-Taylor prisms. Please note also that Applicant admits these prisms are widely used (specification, para 0046, lines 4-5). Such a design choice would naturally be based on the particular environment the device is to operate and would result in ease of manufacture since the components are readily available.

Regarding claim 26, Chu teaches the active component including a laser diode and photo-diode disposed on a substrate separated by a distance and fiber optic cable as already described above.

However, the reference is silent with respect to a core that is connected to the laser diode over a polarization maintaining fiber and connected to the photodiode over a single mode fiber wherein the core transmits light from the laser diode to a fiber optic cable over a first path through the core and transmits light received from the fiber optical cable to the photo diode over a second path through core.

Kokkelink et al. describe a three-port polarization maintaining fiber optic circulator (col 2, line 47-48) that uses polarization mode fiber as well as single-mode fibers (col 4, lines 23-25).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chu et al. to use the optical circulator of Kokkelink et al. with PM fibers and specifically use a single-mode fiber connected to the photodiode for the purpose of coupling light to the photodiode when performance is not as stringent (col 4, lines 23-25).

Regarding claims 27-30, Chu et al. in view of Kokkelink et al. teach the limitations of claim 26 as described above.

However, the reference is silent with respect to the physical dimensions between the laser diode and photo diode of less than 300 microns, less than about 200 microns or the length of the transceiver module being less than 0.75 inches or less than about 0.5 inches.

It would have been obvious to one skilled in the art at the time the invention was made to fabricate the laser diode and photo diode less than 300 microns apart, less

than about 200 microns apart or the length of the transceiver module less than 0.75 inches or less than about 0.5 inches since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art (See In re Rose, 105, USPQ 237 (CCPA 1955)) and has the benefit of reducing the footprint of the transceiver.

Allowable Subject Matter

Claims 16-18 and 31-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 16, a review of prior art failed to make obvious, disclose or fairly suggest a circulator comprising at least one mirror in optical communication with the plurality of polarization beam splitters, garnets and at least one wave plate in addition to the accompanying features of the claim.

Regarding claim 17, a review of prior art failed to make obvious, disclose or fairly suggest a circulator comprising a wave plate coupled to the beam splitter in addition to the accompanying features of the claim.

Regarding claim 18, a review of prior art failed to make obvious, disclose or fairly suggest a circulator comprising a second beam displacer optically coupled to a second wave plate in addition to the accompanying features of the claim.

Regarding claim 31, a review of prior art failed to make obvious, disclose or fairly suggest a core comprising a garnet disposed between a first and second wedge in addition to the accompanying features of the claim.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 4,911,765 to Song et al. and 6,220,764 to Kato et al. show forming a laser diode and photodiode monolithically and bonding them to a substrate. U.S. Patent 6,795,242 to Pan describes an optical circulator with plural beam splitters, garnets and waveplates but is silent with respect to a mirror or reflector coupled to the plurality of elements since it replaces one of the polarization beam splitters. U. S. Patent 6,049, 426 to Xie et al. describe an optical circulator with a PBS, garnet, beam displacer but no wavelength plate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Kalivoda whose telephone number is (571) 272-2476. The examiner can normally be reached on Monday - Friday (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cmk

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